DOCUMENT RESUME

ED 144 720 PS 009 599

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TITLE Fire and Children: Learning Survival Skills.
INSTITUTION Forest Service (DOA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
PUB DATE 76
NOTE 20p.; USDA Forest Service Research Paper PSW-119

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Age Differences; *Childhood Attitudes; Children; Curiosity; *Early Childhood Education; Fear; *Fire Protection; Fire Science Education; Interviews; *Mothers; *Parent Attitudes; Parent Influence; *Personality; Personality Studies; Research; Sex Differences; Socialization; Socioeconomic Influences

ABSTRACT

This paper describes a study designed to investigate: (1) children's interest in, anxieties about, attitudes toward, and reactions to fire; (2) the relationship of particular personality characteristics to attitudes about and behavior with potentially hazardous fire material; (3) socialization techniques and teaching strategies of mothers in situations involving the controlled use of fire materials; and (4) the relationship of mothers' attitudes about fire and teaching techniques to their child's attitudes about and observed performance with fire materials. Subjects included all 5-year-old boys (18) and all 6-year-olds (14 boys and 15 girls) in a nursery school. Assessments of subjects had been accumulated as part of an ongoing longitudinal study of ego and cognitive development. Mothers were interviewed concerning their child's health, development, illness, and accident histories, and interest and experience with fire. Methods used by parents to teach children about fire were explored. The Q-sort method was used to quantify teaching behaviors observed. Children responded to pictures of fire viewed among a series of other pictures; were asked to list "all the things that children sometimes do that are bad"; and took part in a marble guessing game that assessed the tendency to make premature judgments or take risks. Finally, subjects and their mothers were observed as the mother taught her child three fire related tasks. Results for mothers and children are analyzed separately, and generalizations suggested by the results are listed in a discussion section. (Author/SB)

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FIRE AND CHILDREN: LEARNING SURVIVAL SKILLS

Jeanne H. Block Jack Block William S. Folkman

PS 009599

USDA FOREST SERVICE RESEARCH PAPER PSW-119 /1976

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SUMMARY

Block, Jeanne H., Jack Block, and William S. Folkman.
1976. **Fire and children: learning survival skills.** USDA Forest Serv. Res. Paper PSW-119, 14 p. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.

Oxford: 431.3:UDC159.922.7
Retrieval Terms: children-caused fires; fire prevention; fire safety; personality characteristics.

Five and 6-year-old children attending school at the Harold E. Jones Child Study Center of the University of California, Berkeley, were studied to assess their competence in potentially hazardous situations—the specific focus was on fire hazards. This work was an extension of a more extended, longitudinal study of cognitive competence and social-emotional competence. Base data were available on these children from the time they entered the school at the age of 3.

The study was designed . . .

1. To amass information from a number of essentially normal, healthy young children about their interest in, anxieties about, attitudes toward, and reactions to fire.

2. To study the relationship of particular personality characteristics of these children to their attitudes about and performance with potentially hazardous fire material.

3. To assess the socialization techniques and teaching strategies used by mothers in standardized learning situations involving the controlled use of fire materials.

4. To evaluate the relationship of particular techniques used by mothers and their attitudes about fire to the child's perceived attitudes about and observed performance with fire materials.

Wide individual differences in attitudes about fire were found, despite the young age, the relative homogeneity, and the small size of the sample available for study. However, this research is not offered as a final definitive exposition for a particular theory of childhood fire-setting behavior. Its primary value is in suggesting hypotheses for further study in this complex problem area. It does have implications for modifying prevention programs of fire protection agencies.

Five generalizations about children's attitudes toward and behavior with fire are suggested by the findings:

1. Attitudes of boys are markedly different from those of girls. Boys are more interested in fire, have more fantasies about it, and are more frequently involved in fire play. Girls appear to be more fearful of fire, and, for a variety of possible reasons, are less likely to be interested in experimenting with fire materials;

2. Fire assumes increasing salience for children between the ages of 3 and 6 years. Interest in fire is greater at an earlier age than often has been assumed;

3. No racial differences were observed in terms of children's competency in handling of fire materials, caution with fire, fear of fire, engagement in fire play, or in accident histories;

4. Fire play is associated with undercontrol of impulse (i.e., impulsiveness, inability to delay gratification, taking risks) and inability to modify one's level of impulse control in accordance with the demands of the situation;

5. Wide individual differences were found in the extent and nature of the training children were given on the use and dangers of fire materials.

The findings of the study suggest that fire play in very young children is common and should be viewed more as a function of curious, exploratory play than as a function of psychologically driven, psychopathological behavior as might be true of fire-setting by older children.

We found similarities between personality characteristics of children who are more frequently involved in accidents and those showing a keen interest in fire, both with respect to the frequency of exposure to hazards and a lesser ability to cope with hazards encountered. This relationship suggests that methods used in accident prevention may be adaptable to fire prevention efforts.

Parental methods of handling children's interest in fire have implication for fire prevention efforts. Some children keenly interested in fire had been prohibited from touching fire materials; some children most competent in handling fire had been allowed and even encouraged to use fire materials under parental supervision. These observations suggest that prevention ef-

forts might better be directed towards improving ability to cope with environmental hazards rather than toward reducing exposure to risks through prohibitions. Such programs would be aimed at helping the child develop competence in handling potentially dangerous materials (or situations) at times that are appropriate to his or her developmental level.

Parents have had little help in understanding the process by which children learn to develop skills in recognizing and dealing with potentially dangerous situations. Consequently, they adopt means of varying degrees of effectiveness. Many are particularly lax about teaching their children about fire—more than one of every four parents made no attempt to fulfill this responsibility. Parents who are unsure of how to teach their children safety skills would benefit from being shown alternative methods from which they might select a method suitable to the particular needs of their child and one that would be compatible with their own needs and capabilities. There are many difficulties in effectively providing such help to parents. A training film for parents illustrating various possible teaching strategies is suggested.

In the search for specific training strategies, we should not lose sight of other parental child-rearing characteristics that were found in this study to be associated with the development of competence in handling fire materials. Parental child-rearing practices that encourage the assumption of responsibility; promote independence in the child; and encourage rational decisionmaking in the context of clear parental expectations, respect, and caring for the child may be expected to promote the development of ego structures in the child that will both benefit growth and minimize play with fire.

Another general implication of the results of this study suggests that educational programs need to be instituted early in a child's life. By the age of 5, many young children are already interested in and experimenting with fire.

Much of the fire prevention effort of natural resource management agencies is directed at children. This emphasis is based on several sound reasons. First of all, and most obviously, children are responsible for a significant, and growing, proportion of all wildfires. Second, and more importantly, the patterns of carelessness or cautiousness, indifference or concern that people establish as children will largely determine the way in which they will relate to fire as adults.

An earlier study revealed some of the factors associated with children-caused fires (Folkman 1966). This work stimulated the development and testing of conservation fire prevention educational materials and programs for use with early elementary school children (Gladen and Carkin 1970, Folkman and Taylor 1972, Gladen[1]). An exploratory study of children with a history of fire setting provided insight into the personalities and backgrounds of such fire-problem children (Siegelman and Folkman 1971). However, the chronic fire-setter is responsible for but a small proportion of all children-caused fires. The bulk of such fires appears to be started by single offenders—primarily young boys who are expressing an almost universal interest in fire. No one appears to have given attention to how apparently normal boys learn to deal with fire in their lives and avoid misadventures with it. This study seeks to rectify this gap in our knowledge.

This paper summarizes the reports of a study[2] of 5- and 6-year-old children and their interest in, anxieties about, attitudes toward, and reactions to fire. The behavior of both the children and the mothers was analyzed. The findings have implications for fire-prevention programs.

Studies of competence in young children have been focused almost exclusively on two types of competence: cognitive, and social or interpersonal. Little research has been done on the child's competence in potentially hazardous situations. In such contexts, both the cognitive abilities to perceive risk and anticipate consequences and the personality attributes associated with the ability to control impulse and to cope with stress are involved. Accordingly, one of the primary aims of this study was to assess this aspect of competence—the child's ability to deal with hazardous situations.

Similarly, previous research on teaching strategies used by mothers has been limited exclusively to situations in which the parent attempted to help the child with problem-solving tasks. However, much tutoring of young children necessarily involves the teaching of survival skills, and little is known about the processes whereby children are taught to develop respect for and skill in dealing with potentially dangerous situations.

Specifically, the purposes of the research were to:

- Amass information from a number of essentially normal, healthy young children about their interest in, anxieties about, attitudes toward, and reactions to fire;
- Study the relationship of particular personality characteristics of these children to their attitudes about and performance with potentially hazardous fire materials;
- Assess the socialization techniques and teaching strategies used by mothers in standardized learning situations involving the controlled use of fire materials; and
- Evaluate the relationship of particular maternal techniques and attitudes about fire to the child's perceived attitudes about and observed performance with fire materials.

Two variables, central to the larger longitudinal study of personality and cognitive development in young children, appear to be important dimensions related to children's caution or carelessness in the face of fire. These are *ego-control* and *ego-resiliency*. Ego-control relates to the ability to constrain impulse. The child who lacks ego-control tends to be impulsive, cannot delay gratification, is more inclined to take risks, and is more expressive than children who may be overly restraining of impulse. In the present research context, we predicted that children who are more undercontrolling of impulse would be less cautious in their handling of fire materials and would have engaged in more fire play.

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[1] Gladen, Frank H. 1973. *The final report for the elementary school individualized instructional materials research and development program in conservation and fire prevention education 1971-1973.* (Unpublished report on file, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.)

[2] Block, Jeanne, and Jack Block. 1975. *Fire and young children: a study of attitudes, behaviors, and maternal teaching strategies.* (Unpublished report on file, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.)

The research was supported by a research contract from the Pacific Southwest Forest and Range Experiment Station and by a research grant (MG 16080) and a Research Scientist Development Award from the National Institutes of Mental Health to the senior author. We gratefully acknowledge the contribution of Jean Murphy, who collected the data for the part of the study on assessing fire-related behaviors and attitudes, and of Dr. David Harrington, who helped facilitate the study.

The second dimension, ego-resiliency, reflects the child's ability to modify his or her conventional level of impulse control in accordance with the demands of the situation. In this study, the ego-resilient child was expected to exercise greater precaution in the handling of fire materials, to check safety, and to maintain integrated, competent performance during the experimental situation.

The children's ego-control and ego-resiliency at age 3 and at age 4 were measured by teachers as part of the longitudinal study using the California Child Q Set (CCQ).[3]

METHODS

The children studied were attending the Harold E. Jones Child Study Center of the University of California, Berkeley. The sample included all 5-year-old boys (18 in all), and all 6-year-old children (14 boys, 15 girls), attending the Child Study Center nursery school. The decision to over-represent boys was based on evidence from earlier studies of clear sex differences in fire-related behaviors. Girls were included in the 6-year-old study group in order to examine the attitudinal and behavioral differences between boys and girls in fire related tasks.

The study-group is heterogeneous with respect to racial and ethnic origins and educational and socioeconomic levels of parents, although it is skewed toward the upper middle class. As part of the ongoing longitudinal study of ego and cognitive development, detailed assessments had been accumulated for each child from the time he or she entered the school at about age 3. The children had been assessed periodically by means of game-like tests in standardized but natural situations, standardized tests, observations in open-field settings, and teacher evaluations. Parents and home situations had also been assessed.

To add to these data from the base study, we interviewed in depth the mothers of children in the fire study about their children's health, developmental, illness, and accident histories. Specific questions were addressed to the children's interests in and actual experience with fire. Methods used by parents in teaching their children about fire were explored. The Q-sort technique (a scaling method used to obtain a picture of the individual's own view of, or attitude toward, the object being considered) was used to quantify behaviors observed in the teaching situation.

Three methods were used to obtain additional data from the children to provide information about their attitudes and reactions to fire. The first method was a modification of a projective test previously used in the longitudinal study in which each child reacts to a standard series of pictures. For purposes of the fire study, two additional pictures representing fire scenes were developed and included in the series. This test was designed to reflect developmental status in the emotional sphere. The second method was to administer a test to each child (also previously used in the longitudinal study) by asking him or her to enumerate "all the things that children sometimes do that are bad." This test was included in order to examine the relationship between the child's understanding of prohibited activities and behaviors vis-a-vis fire. The third method was to have each child take part in a marble guessing game that assessed the tendency to make premature judgments or to take risks.

Finally, each mother was observed as she taught her child three fire-related tasks—lighting candles on a birthday cake, boiling water on a camp stove, and using sealing wax. Specific instructions were given the mother while the child played in an adjacent room. The mother was told that the situation was purposely left rather open so that she could decide how best to proceed with her child. It was stressed that we were interested in seeing some of the many ways that different parents develop when they try to teach their children to do something safely.

After the home visit, the experimenter codified her observations and impressions of the home and neighborhood environment in which the child was living by completing a 59-item Q-sort pertaining to environmental qualities, including such dimensions as presence or absence of hazards about the home, the child-centeredness of the home, the presence or absence of clutter, and opportunities for outdoor play. It was anticipated that a systematic description of the home situation might provide additional background data relating to both the behavior of the mother in the fire tasks as well as the fire-relevant attitude and behavior of the child.

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[3] Block, J. H., and J. Block. *The California child Q set: a procedure for describing personological characteristics of children.* 1969. (Unpublished report on file, Department of Psychology, University of California, Berkeley.)

RESULTS

Nature of Fire Experiences and Interest

Base line data concerning the incidence of fire play, burns, fears, and salience of fire among relatively healthy, normal young boys and girls were provided by the interviews with mothers and by observed behaviors of their children.

In this study of 47 children with above average IQ's (mean = 116.7), mostly intact middle-class families, we had hardly expected to find a high incidence of fire setting. And yet we found that two boys had been involved in agency-documented fire play. Additionally, the brothers of three girls included in the study were reported to have also been involved in fire play.

The information available from this study probably underestimates the "true" incidence of fire play. Much fire play undoubtedly goes undetected and, therefore unreported. Further, these children do not represent a "high risk" group, differing as they do in demographic characteristics, and health and emotional histories from those of fire setters in earlier studies.

Eight of the children in the study had suffered burns serious enough to require medical attention. None of these were the result of play with fire, however. Eight children—six girls and two boys—were described by their mothers as having considerable fear of fire. One child had been seriously burned at an early age, and four children had siblings or other relatives who had been burned (three as a result of clothing catching on fire from a fireplace). A relative of another child had been a fire setter and the child was experiencing nightmares about fire. Mothers of the two remaining children could not account for their children's strong fears of fire.

Interest in fire, reflected, for example, in requests to light matches or in playing with fire materials without permission, was significantly higher among boys than among girls according to report of mothers (59.4 percent, compared to 33.3 percent, respectively). Few mothers were concerned about the fire interest of their children. None of the mothers of girls and only 18.8 percent of the mothers of boys said they were worried about their child's interest in fire. The feeling was commonly expressed that interest in fire was a phase of normal development that would soon be outgrown.

When asked how they attempted to handle the child's interest in fire, the largest number of mothers indicated that they provided opportunities for the child to use fire materials under supervision in lighting fires in the fireplace, building campfires, lighting candles, and similar activities. Talking with the child about fire—explaining its dangers—was the next more frequent method mentioned. Four mothers indicated that they expressly forbade their children to play with fire.

The most common responses to the question "What is the most important thing you want your child to learn about fire?" were:

Response:	*Percent Reporting*
The dangers of fire	38.8
The importance of learning how to handle fire safely and competently	23.0
The importance of staying away from fire altogether	13.0

Some mothers tried to impress their children with both the dangers of fire and the importance of developing competence. Interestingly, five mothers of boys, whom they had described as interested in fire, reported that they had never really talked with their sons about fire. For the total sample of children, including children who were reported as never having shown an interest in fire, 13 mothers (27.6 percent) reported that neither parent had discussed fire or attempted to show their child how to use fire materials. They either thought it unnecessary or had never given it any thought.

The salience of fire in the thinking of the children was evaluated in two ways. First, by reference to the results of the Conceptions of Badness inquiry wherein the subjects were asked to enumerate prohibitions that children sometimes violated. This enumeration showed an increased mention of fire with age. (This procedure had been included in the test batteries of the longitudinal study of children at ages 3, 4, and 5 as well as having been administered to the subsample of children participating in the Fire Study.) The percentages of children of various ages mentioning fire as "bad" were:

Age of child:	*Percent Reporting*
3 years old (N=118)	2.5
4 years old (N=128)	5.5
5 years old (N= 85)	14.1
5 and 6 years old (Fire Study children) (N= 47)	21.3

Although this test was administered to the Fire Study children before their participation in the fire tests, the presence of the experimenter's fire extinguisher may have influenced the number of references to fire play among this subsample.

Sex differences in the salience of fire are reflected in the preponderance of boys listing fire play; 77 percent of those mentioning fire were boys.

Another indicator of the salience of fire among pre-school children is the frequency of fire themes in free play. Records of clinician's observations of a 20-minute structured free-play situation from the longitudinal study were examined to determine the incidence of fantasy play regarding fire. All of the children playing out themes of fire were boys. The protocols describing this play revealed this distribution by age:

Age of child:	*Percent Reporting*
3 year olds	2.6
4 year olds	12.5
5 year olds	11.4

On the basis of mothers' interview responses in the Fire Study regarding preferred activities of their children, we found that a preference for fantasy play was significantly related to fire interest ($r = .31$; $p<.05$). This relationship suggests that dramatic play may be a way of coping with the fascination fire holds for some children. That anxiety may underline play concerned with fire is implied by the content of such play. Responses in the test situations and mothers' interviews suggest that anxiety is an important component in the child's perception of fire.

Analysis of Mothers' Behavior

Three measures were used in this study to assess mothers' behavior. Scores on two dimensions were derived from observations of the mothers during the fire task teaching situation: (1) The *Maternal Caution* score reflects the safety precautions taken by the mother in her handling of the fire materials, and (2) the *Explanation* score reflects the explanations of specific measures made to the child by the mother. Only the 41 mothers participating in the fire tasks have scores on these variables. The third independent variable, *Supervised Training*, is a composite score based on responses by all 47 mothers. This score reflects the reported explicit attempts on the part of parents to teach their child to use fire materials in a safe manner, i.e., teaching the child how to light matches, to help build fires in the fireplace, to help with campfires.

Those scoring high and low (above and below the median) on these independent variables were evaluated systematically against nine data sources comprising the dependent variables (see Appendix).

Mean scores of the two groups, the t values, and indications of the significance of the differences between means were computed. Probability levels were based on two-tailed tests of significance, except in a few instances when not appropriate. Items significant at or beyond the 10 percent level of probability were included because of the possibility of comparing results with overlapping but independent data sources. Assertions that groups *do not differ* on particular characteristics are based on t values less than 1.00. Indications in the text that two groups *tend* to differ are based on t values greater than 1 but less than the 1.69 required for significance at the 10 percent level, given the degrees of freedom available.

Explanation–Mothers providing their children with more explanations and reasons during the fire tasks did not differ in educational levels achieved from those who scored low on this dimension. This was true of the spouses, as well. Age, sex, and IQ distributions of the children were also similar in both groups. Mothers providing more explanation did have higher socio-economic status ratings than did mothers in the low scoring group. Mothers in the high group reported providing more supervised training in use of fire materials. Similarities between high scoring mothers in the fire study and those who provided explanations and rationales for their children in the cognitive training tasks of the longitudinal study suggest some generality of teaching styles across the two different types of situations. Observers in describing both groups of mothers as effective teachers used such terms as clear and coherent, patient, supportive, encouraging their children to proceed independently. These mothers appeared relaxed, spontaneous, and resourceful. They, and their spouses, appear to have developed a clear set of standards for themselves and their children. However, despite differences in child-rearing orientation, teaching styles, and environmental concepts, the children of high and low scoring mothers were not seen as differing either in their personality characteristics or in their behaviors with regard to fire.

Supervised Experience–This division was based on the responses of mothers to questions about the amount and nature of explicit training they provided their children in the use of fire materials. In both the

high and low scoring groups, no difference in the age or sex distribution of the children were found. The educational level of the fathers and the socio-economic ratings of the families were also equivalent. High-scoring mothers tended to be better educated. The high group had significantly fewer minority group families, and the IQs of the children were higher (120 vs. 112 for the high and low groups respectively; $p < .05$).

Mothers who reported having emphasized fire training in the home appeared to perceive their training as successful. They appeared to have confidence in their children and allowed them to proceed independently in the fire tasks. Mothers who had not emphasized fire training in the home were observed to be more active in their teaching. They were more talkative, dramatized their teaching, and seemed to get into more power struggles with their children. The descriptions by nursery school teachers of the children who received explicit training at home in handling fire materials indicate that the children were considered reasonable, curious, outgoing, expressive, and socially comfortable. In families placing less emphasis on fire training, the fathers reported greater concern about the welfare of their children, and worried more about their health and their future. They appeared to make fewer demands on their children. It would appear that in their attempts to protect their children, parents in the low Supervised Experience group are reluctant to expose them to potentially hazardous situations—even under close parental supervision.

Maternal Caution—Only a few significant differences emerged from the comparisons of mothers scoring high and those scoring low on the Maternal Caution variable. Although maternal caution appears to be consistent across the three fire tasks and shows some relationship to cautiousness of the child in handling fire, it does not seem to predict behaviors of either mother or child in other settings.

Analysis of Children's Behavior

Five summary scores derived from the coded responses in the mothers' interviews and one obtained from the observation of the children's behavior during the fire tasks were used in analyzing the behavior of children with fire:

1. *Child's interest in fire.* Reflects the mother's perception of her child's interest in fire as expressed in play with fire, requests to light fires, talking about fire, or similar behavior.

2. *Child's fear of fire.* Reflects the mother's perception of her child's fear of fire as expressed verbally or in active avoidance of situations in which fire is involved.

3. *Fire competence.* Reflects the child's competence in using fire materials as related by mother.

4. *Fire play.* Reflects the documented participation of the child in play with fire.

5. *Accident liability.* Reflects the extent to which the child has been involved in accidents resulting in broken limbs, serious cuts, burns, contusions, or similar injuries.

The item derived from observation of the children's behavior during the performance of the fire tasks was the Child's Caution score. This reflected the safety precautions exercised by the child in those cases where he or she was allowed personally to handle the fire materials (only 15 children were so permitted).

Fire Caution—There were no significant differences in demographic characteristics between the high and low groups of children. The two groups were equivalent in age, IQ, race, and sex compositions. There were no significant differences in the educational levels of the two groups of fathers nor in the socio-economic status of the families. Mothers of the children in the high Caution group tended to be better educated.

Cautious children appear to be more controlled, submissive, and docile and come from homes where they are more closely supervised than do children in the low scoring group. Their mothers also appear to be more inhibited and controlled. Caution in the fire tasks appears to generalize to other areas of experience, independently assessed, since children scoring high on caution also were described by their nursery school teachers as docile, undemanding in interpersonal situations, and more controlling of impulse expression.

The two children with a history of documented fire play were represented in the low caution group.

Competency in Handling Fire—The high and low groups did not differ with respect to age of children, racial composition, or in the educational levels attained by fathers and mothers. The high Competency group tended to have higher socio-economic ratings. Only boys were represented in the high group ($p < .05$), and the IQs tended to be higher for children in the high group ($p < .10$).

Mothers of children who are described as competent in their handling of fire materials appear to respect the competence of their children and to allow them to proceed independently. Fathers of children in this group place greater emphasis on the achieve-

ments of their children, and both parents seem relatively free of anxiety about their children. The children in the high group appear more controlled, being described as less expressive, active, and responsive than their peers in the Low Competency group. The latter were said to be more easily offended and to behave in accordance with the sex stereotypes of our society.

Competence in this context did not derive from more explicit, supervised training in the use of fire, but appeared to develop as a result of parentally encouraged independent experimentation in the home. These boys were perceived as generally competent in a wide range of situations, bright, trustworthy, and concerned with their own safety.

Fear of Fire—Comparisons on this variable are between eight children who were said by their mothers to have strong fears about fires and the other children. The two groups did not differ in terms of age, race, intelligence, or in fathers' educational levels. There were significantly more girls in the Fear groups (6 of 8; $p < .01$), and the educational levels of mothers in this group tended to be higher. Two of the children in the Fear group elected not to participate in the fire tasks, and one child quit after lighting candles on the birthday cake.

Children who are fearful of fire tend to be girls, have been more frequently burned, are less interested in fire, and tend to withdraw from situations in which fire materials are involved. The more fearful children appear less at ease in new situations and might be characterized as more anxious generally than their less fearful peers. Mothers of these children were described as more controlling in several contexts. However, the relatively few differences characterizing the mothers, fathers, or environmental contexts of the more or less fearful children suggest that fears of fire may have developed from a greater number of unfortunate experiences with fire on the part of the high group.

Fire Interest—Analysis of the demographic data revealed no differences in the educational levels achieved by fathers, in socio-economic ratings, or in the IQs of the children in the high and low Fire Interest groups. Fewer children from minority groups tended to be represented in the high group ($t = 1.42$) and mothers of children in the low group tended to be better educated ($t = 1.21$). As might be expected more boys scored above the median of Fire Interest (79.1 percent and 56.5 percent for the high and low groups, respectively, $p < .10$). Despite the relative homogeneity of the total sample with respect to age, children in the high Fire Interest group were significantly younger (mean ages 59.8 and 62.7 months, respectively, $p < .01$).

The results on interest in fire suggest that for most children such interest may be a passing phase, soon outgrown. In addition to age differences, this observation is based on differentiating personality characteristics reflecting lesser maturity rather than psychopathology. The nursery school teachers' protocols describe the high Fire Interest children as more immature, more readily moved to tears, and as preferring nonverbal methods of communication. They were also described as tending to be more easily victimized and stubborn. In contrast, and consistent with their greater age, low Fire Interest children were seen as considerate, emphatic, concerned with fairness, and as tending to be more competent, interesting, and creative.

The items discriminating between mothers in the two groups do not appear, however, to be related to the age differences in the children. Mothers of high Fire Interest children handle them with kid gloves, attempting to avoid confrontations. They make fewer demands, are less emphasizing of achievement, and tend to be less effective teachers. Although fathers of high Fire Interest children appear to have established expectations for their children, these appear more in the area of conformity than in the area of achievement and maturity.

History of Fire Play—Documented evidence of fire play was available for only two boys in the sample. Others may have been similarly involved, but we had no evidence of such play. Obviously, it is hazardous to attach significance to data based on only two instances, but the importance of trying to learn as much as possible about children who have actually played with fire justifies some analysis. None of the demographic variables reliably differentiated the boys with a history of fire play from their complement group. Their combined score on the Undercontrol Index was .23 in contrast to −.03, the average for the remainder of the sample. They were observed to be considerably less careful in lighting the candles on the birthday cake. Data from the mothers' interviews revealed that the two boys were provided fewer opportunities for supervised use of fire materials, tended to be punished more often for playing with fire, and were more often burned. The mothers of the Fire Players encouraged independence and autonomy according to their self-reporting of child-rearing attitude. They tended to be less trusting of their sons, but placed relatively more emphasis on achievement than did mothers in the complement group.

Parents of one of the Fire Players are divorced.

This, in itself, would not be notable, were it not seen in the light of findings from other studies (Biller 1971, Biller and Merideth 1975, Siegelman and Folkman 1971).

Personality characterizations by nursery school teachers show the two boys to be more active, competitive, interesting, accepting of their own negative feelings, and more open than those in the complement group. They were also described as being admired by their peers.

Other ratings characterize the Fire Players as distractable, curious, fidgety, and less dependent on adults. Their mothers saw them as more restless and less obedient. All of these differentiating items suggest that the differences center about control of impulse—with the Fire Players more undercontrolling than their peers. In these instances, however, playing with fire does not appear symptomatic of psychopathology. The mothers' willingness to grant their sons autonomy and to allow them latitude increases the probability for such active, curious youngsters, whose spontaneity may limit the anticipation of consequences, that some untoward accident may occur during the childhood period in which the testing of limits is an important theme.

Accident Frequency—From what we have seen thus far in our analysis, interest in fire might be expected among presumably normal children. When a single fire-setting incident is reported during early childhood years it would not appear to be the outgrowth of familial and inter-psychic conflict such as was encountered in an earlier study of children involved in repeated fire setting (Siegelman and Folkman 1971), but has more the characteristics of an accident. In this context, a comparison of children with low accident rates may aid in our understanding of the fire experiences of children. The interviews with mothers provided the accident history of each child. Accidents reported by mothers included burns, broken bones, sprains, cuts requiring stitches, frequent bruises which were sustained as a result of falls, getting too close to hot objects or fires, rough-and-tumble play, and running into the street. Children whose accident rates were above the median were contrasted with those whose rates were below.

No significant differences in demographic and socio-economic characteristics were found when we compared the high and low scoring children. However, when teaching strategies used by the mothers were compared, some differences were detected. Observers found mothers of children scoring high on Accident Frequency to be somewhat undercontrolled in communicating, both physically and orally, with their children, and in surrendering control of the teaching situation to their children. Mothers of the low-scoring children were described as providing more instruction, giving attention to the cognitive aspects of the teaching tasks, and emphasizing the principles underlying successful performance. These mothers were also seen as enjoying the role of teacher, as being resourceful and—while providing guidance—avoiding intrusiveness. In sum, the principal difference between the two groups of mothers was in task orientation. Mothers in the low Accident Frequency group appeared to take their teaching seriously; the mothers in the high groups tended to be more reactive, expressing their frustrations and disagreements, and allowed their children to assume control of the situation.

The child-rearing practices of mothers whose children scored high on Accident Frequency reflect a disinclination to set limits for their children—they allow their children more autonomy and provide less guidance—an orientation that may increase exposure to potential injury. The reported child-rearing practices of fathers of these children tended to reinforce the practices of their spouses.

Descriptions of the home situations tend to indicate somewhat more concern with organization and harmonious functioning on the part of families in the low Accident Frequency group. The presence of familial conflict was noted in the homes of high scoring children.

Personality descriptions by nursery school teachers, behavior ratings by the experimenters, and mothers' adjective descriptions all produce results consistent with each other and with the index scores on the Undercontrol and resiliency dimensions. Children in the high Accident Frequency group were found to be less able to cope with stress and were more undercontrolling. Such children are more likely to find themselves in situations involving risk. And with their limited ability to handle stress, the probability of injury or accident is great. The implications of these child traits is compounded when they exist in the context of the parental child-rearing practices that encourage autonomy, accept fighting and participation in rough games, and deemphasize supervision and limit-setting.

Other Experimental Procedures

Risk-Taking Behavior—The risk-taking dimension was evaluated by a procedure requiring the child to determine the predominant of two colors of marbles

in an opaque container by extracting, one by one, as many marbles, or as few, deemed necessary for a decision. Three trials were conducted with each child – one with a color ratio of 70/30, the second, 60/40, and the third, 55/45. The measure proved reliable in terms of its psychometric properties, but it was undifferentiating in its correlations with the children's "real-world" risk exposure as defined by experiencing accidents or playing with fire.

Responses to the Little Bear–The responses to the series of pictures depicting Little Bear in a variety of situations–some happy, some sad–were scored in two ways: Number of affective responses, e.g., "Little Bear is looking out the window feeling sad," "Little Bear is afraid," "Little Bear is happy playing," and causal attribution in the case of the picture depicting a forest fire.

Results from other research studies suggest that fire setters are characterized by an impoverished inner life (Siegelman and Folkman 1971). It was expected, therefore, that children showing high interest in fire might also be less introspective, resulting in fewer affective responses to the Little Bear pictures. As expected, children scoring high in Fire Interest, and those identified as having previously been involved in fire play gave significantly fewer affective responses ($p < .05$ and .02, respectively, one-tailed test). The high Fire Interest group and the Fire Players tended *not to* attribute the cause of the forest fire to Little Bear, whereas, unpredictably, children in the Fire Competent group significantly more often attributed the cause to Little Bear ($p < .01$).

Concepts of Badness–It was anticipated that the salience of fire in the lives of children might be revealed by the extent to which they mentioned playing with fire in response to the question "What are things that children sometimes do that are bad?" As reported earlier, this question had been asked of children previously in the longitudinal study at ages 3, 4, and 5. Responses involving fire increased in frequency over the 3-year period. For children participating in the Fire Study, fire play tended to be mentioned more often by children scoring high on Fire Interest in contrast to those scoring low ($p < .09$, one-tailed test); and by children scoring high on Accident Frequency compared to those scoring low ($p < .05$, two-tailed). For all other group combinations, differences between high and low scoring children were not significant.

Parent-Child Similarity–Siegelman and Folkman (1971) reported that boys with multiple fire-setting histories were seen by their mothers as being less similar to their fathers than were boys who had set but one fire. Comparable father-child similarity and mother-child similarity indexes were developed for the boys in this study, but no significant differences among the various criterion groups were found.

DISCUSSION AND IMPLICATIONS

Despite the young age, the relative homogeneity, and small size of the sample available for study, wide individual differences in attitudes about fire were found. In considering the results of this study, it should be recognized that the criterion groups for comparison are small, thus attenuating the possibility of discerning differences. These limitations are alleviated, to some degree at least, by the independence of the data which were collected from several sources, in addition to that of the Fire Study, itself. Conservative methods of data analysis were used to minimize the considerable statistical problem of dealing with all of the multiple comparisons made available by the various independent data sources. Only those results were emphasized which are both statistically significant and supported by a meaningful coherence among the differentiating items across other independent data domains. This research is not offered as definitive support for a particular theory of childhood fire-setting behavior. Its purpose was to determine the attitudes and behaviors associated with fire in an essentially healthy group of normal children who were unselected for fire-setting behavior. The primary value is in suggesting hypotheses for further study in this complex problem area. However, we cannot refrain from pointing out some of the implications for prevention and education efforts by fire protection agencies.

The findings suggest five generalizations about childrens' attitudes toward and behavior with fire:

1. There is a decided difference in boys' and girls' attitudes toward fire. Boys are more interested in fire, have more fantasies about it, and are more frequently involved in fire starts. Girls appear to be more fearful of fire, and, for a variety of possible reasons, are less likely to be interested in experimenting with fire materials;
2. Fire assumes increasing salience with age. Over

the ages studied, 3 to 6 years, children showed an increasing interest in fire. Fire interest develops earlier in children than often has been assumed;

3. No racial differences were observed in terms of competency of children in handling fire materials, caution with fire, fear of fire, engagement in fire play, or in accident frequency;

4. Fire play is associated with undercontrol of impulse (i.e., impulsiveness, inability to delay gratification, taking risks) and inability to modify one's level of impulse control in accordance with demands of the situation;

5. The extent and nature of the training given children by parents on the use and dangers of fire materials differ widely.

Parents have had little help in understanding the process by which children learn to develop skills in recognizing and dealing with potentially dangerous situations. Although parents presumably feel responsible for teaching their children survival skills related to avoiding street accidents, drowning, burns, ingesting poisonous substances, and so on, this study reveals that they differ markedly in the amount and nature of the training they provide. They are particularly likely to be lax in teaching their children about the use of fire. Anxieties carried over from their own childhood experiences with fire seem particularly to mediate against the effectiveness of some parents in this type of survival training. Among parents for whom survival training concerning fire was recognized as a necessary part of a child's socialization, a variety of methods were found to have been used.

Some parents conducted a series of "controlled experiments" with their children in which demonstration of the safe use of matches was followed by allowing the child, for example, to light fireplace fires, candles, or parents' cigarettes. Such an approach, obviously, is only effective with children of proven maturity and dependability, since some children may construe permission to light a fire in the parents' presence as blanket permission for unsupervised use of matches. Other parents have discussed fire with their children, describing and illustrating necessary precautions to be taken but not allowing the child to use fire materials, even under supervision. Some parents reported using fear-induction in the attempt to control the child's interest and experimentation with fire, while other parents rely on punishment for this purpose.

In this present study, some mothers indicated that they had tried to discourage fire play and had refused to let their children use matches. Their rules, however, in contrast to those of the mothers of recidivist fire setters, appeared reasonable, were described matter-of-factly, and were not invested with undue anxiety or emotion.

Comparison of mothers' behavior in teaching cognitive skills (in the longitudinal study) and fire safety skills shows that the basic mother-child relationship is relatively stable, while the specific techniques, strategies, and modes of dealing with the child may differ with the demands of the situation. This difference suggests that parents who are unsure of how to teach their children safety skills would benefit from being exposed to alternative methods of training.

The findings regarding ego-control and ego-resiliency of high and low Fire Interest Children suggest that fire play in very young children should be viewed more as a function of curious, exploratory play than as a function of psychologically driven, psychopathological behavior that is more apt to be causally implicated in the fire-setting of older children. We found similarities between personality characteristics of children with high accident frequencies and those showing a keen interest in fire, both with respect to hazards encountered and the ability to cope with hazards. Methods used in accident prevention, may, therefore, be adaptable to fire prevention efforts.

Intervention efforts on behalf of fire prevention may take many different forms. They may be primarily instructional or they may be directed toward reducing exposure to hazards or toward enhancing the ability to cope with hazards or both. As Mellinger and Manheimer (1967) note in conjunction with accident prevention, there are philosophical issues involved in such decisionmaking since it is possible that our complex modern society overemphasizes control and risk avoidance at the price of spontaneity and creativity. If such be the case, then "prevention efforts might better be directed toward improving the child's ability to cope with environmental hazards rather than toward discouraging otherwise desirable behavior patterns which happen to also increase exposure to hazards" (p. 106). It may be possible, however, to retain the positive personality characteristics that are correlates of risk-taking—curiosity, openness to experience, vitality—and still reduce exposure to hazards if intervention efforts are concerned with helping the child develop the ability to anticipate consequences of potentially dangerous actions. Intervention programs modeled after this possibility would have as their goal helping the child develop competence in handling potentially dangerous materials (or situations) at the developmentally appropriate time.

The curriculum for young children developed by

Spivack and Shure (1974) emphasizes a cognitive approach to the solution of real-life problems. It was designed to encourage children to generate alternative problem solutions and to evaluate the problem consequences of particular actions. This approach, with some modifications, would seem to be appropriate for use in fire prevention efforts with young children. It is particularly sensitive to the concerns raised by Mellinger and Manheimer (1967). Programs oriented to the prohibitions–the "Thou Shalt Nots"–may be less effective, since the curious, exploring, active child the child most likely to experiment–may well decide to test the rules and to experience the forbidden.

Another general implication of the results of this study suggests that intervention programs might be instituted earlier than has generally been done. By the time they are 5, many young children have become interested in fire and some may have already experimented with it.

The lack of relationship between fire behavior and ethnic and socio-economic backgrounds suggest that fire prevention efforts may be designed to appeal to a wide cross-section of children–different ethnic groups and different socio-economic classes. The development of programs for specific socio-economic or ethnic target groups need not be considered, unless it is on the basis of stimulating greater response, but not because of differences in fire interest.

Finally, the results of the present study suggest that it is important to develop programs for parents. Such programs might encourage parents to include fire training explicitly in their socialization efforts and might suggest alternative methods for helping children develop responsibility about fire. Twenty-six percent of the mothers participating in this study said neither they nor their spouses had attempted to provide fire safety instructions for their children. Considering the over-representation of upper-middle-class and well-educated parents in our sample, this percentage probably underestimates the numbers of parents who do not offer such instruction for their children.

There are, of course, many difficulties in developing effective programs for parents to encourage them to assume more responsibility for training their children in fire safety. One of the means that might be considered is a training film for the parents. This film would alert parents to their responsibilities in this area of their child's development and bolster their confidence in their ability to deal with it. It would introduce them to illustrations of alternative methods of teaching children about fire, from which they could choose strategies compatible with their, and their children's, individual needs and capabilities. It is imperative that the approach used be based on a realistic conception of their children's maturity and dependability.

Intervention efforts on behalf of fire prevention may take many forms, from a purely instructional approach to attempts to reduce exposure to hazards or to enhance ability to cope with them. Several approaches have been discussed at different points in this report. They may form a core for use in instructional programs designed for parents. These several approaches include:

1. The *Instructional* approach, as represented in the conservation/fire prevention materials developed for Headstart (Folkman and Taylor 1972).

2. The *Generative* approach in which children are asked to anticipate consequences in different situations involving fire and to develop alternative methods of response to such hazardous situations (Spivack and Shure 1974).

3. The *Discussion* approach in which age-appropriate discussions about fire and its consequences take place between parent and child. This method was reported by some parents in the study and is related to some aspects of the Team Teaching used by the California Division of Forestry with school-age children (Goings 1968).

4. The *Controlled Experiment* approach in which parents demonstrate the safe use of fire materials under controlled conditions and then encourage the child to follow parental example under supervision.

In the search for specific training strategies, we should not lose sight of other socialization emphases that were found in this study to be associated with the development of competence in handling fire materials. Parental child-rearing practices that encourage the assumption of responsibility, promote independence in the child, and encourage rational decisionmaking in the context of clear parental expectations, respect, and caring for the child may be expected to promote the development of ego structures in the child that will both benefit growth and minimize play with fire.

APPENDIX

Data sources used in analysis were:

1. Maternal Child-Rearing Practices Reports (CRPR), a set of 91 socialization-relevant items *Q* sorted into seven categories ranging from *Most Salient or Descriptive* to *Least Salient or Descriptive*. A rectangular distribution was specified with 13 items to be assigned to each of the categories. These descriptive *Q* sorts of socialization attitudes and practices were completed by the mothers when their children were between 3 and 4 years of age (either 2 or 3 years before the collection of data for the present Fire Study).

2. Paternal CRPR *Q*-sort responses, paralleling the procedure used with mothers described above.

3. Maternal Teaching Strategies *Q*-sort descriptions (TSQ), a set of 49 items describing the behaviors of mother, and to a lesser extent, child, in a cognitive teaching situation. Mothers were asked to help their children accomplish four different tasks varying in their demand characteristics. After the tasks were completed, the experimenter and, in some cases, an observer, completed the *Q*-sort using a rectangular seven-step distribution. These data were collected either 1 or 2 years earlier than those in the present study. Of the 49 items in the TSQ set, 43 overlap with those used to describe maternal behaviors in the fire training tasks.

4. California Child *Q*-sort Descriptions (CCA), a 100-item *Q* set completed independently by three of the child's nursery school teachers. The separate descriptions for each child were averaged to form a composite. These data, too, were obtained 1 or 2 years earlier when the children were enrolled in the nursery school program for 4 year olds.

5. Behavior Ratings, representing the composited description of each child completed independently by the seven experimenters seeing each child during the 4-year-old assessment period.

6. Mothers' Adjective *Q*-Sort Description of Child, based on a set of 42 adjectives sorted by the mother into seven categories with six adjectives being placed at each step. These data were collected after completion of the testing session in the Fire Study.

7. Mothers' Adjective *Q*-Sort Self-Descriptions, using the same set of adjectives, each mother completed a self-description *Q*-sort.

All of the data described in the above sections are completely independent of the data generated by the experimenter conducting the Fire Study. Three data sources depend upon self-report: The Maternal CRPR, the Paternal CRPR, and the Mothers' Adjective Self-Descriptions. The adjective descriptions of the children derive from maternal perceptions. The descriptive personality data are based on the composited ratings of three (CCQ) or more (Behavior Ratings) observers. For approximately half of the mothers participating in the cognitive teaching strategies situation, two observers contributed their impressions via independent *Q* sorts.

Two remaining procedures, completed by the experimenter in the Fire Study, are not independent. These are: (a) the Fire Training *Q*-Sort descriptions (FTQ) describing maternal teaching behaviors, and (b) the Environmental *Q*-Sort Descriptions (EQ) describing the contextual nature of the child's home environment.

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A number of essentially healthy 5- and 6-year old children were studied to determine their interests in, anxieties about, attitudes toward, and reactions to fire. The relationships of particular personality characteristics of the children and the socialization techniques and teaching strategies of the mothers to the children's perceived attitudes about and observed performances with fire materials were determined. The findings suggest that fire play in very young children is common—more a function of curious, exploratory play than a function of psychologically driven, psychopathological behavior as might be true of fire-setting by older children. Similarities were found between personality characteristics of children with high accident rates and those showing a keen interest in fire. Educational programs emphasizing cautious use of fire materials need to be instituted early in a child's life as interest in fire frequently develops by the time he or she is 5 years old.

Oxford: 431.3:UDC159.922.7

Retrieval Terms: children-caused fires; fire prevention; fire safety; personality characteristics.

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